



Getty Oil Company

P.O. Box 7900, Salt Lake City, Utah 84107 • Telephone (801) 263-3850

May 3, 1982

Mr. Calvin Sudweeks, Director Bureau of Water Pollution Control Box 2500 Salt Lake City, Utah 84110

Attn: Mr. Earl Pierce

Re: Construction Permit Reservation Canyon Tailings Pond

Mercur, Utah

Dear Mr. Sudweek:

As per your conditional construction permit for the above referenced facility issued April 27, 1982 we are submitting the attached construction specifications for the clay liner.

The clay liner over permeable materials will be placed in 3 lifts and compacted to the same specifications as applied to the clay core of the dams. Over areas exposed impermeable shale, the shale will be ripped to a depth of 12 inches and recompacted to the same compaction specifications.

The Stage I impoundment area map showing the topographic modification as well as areas of exposed shall versus clay liner is also attached.

Very truly yours

Brian W. Buck

Environmental Coordinator

BWB:meg

Attachments

# MERCUR GOLD PROJECT GETTY MINING COMPANY Salt Lake City, Utah

GENERAL SPECIFICATION GC-18

FOR

RESERVATION CANYON TAILING DISPOSAL DAM

DAVY McKEE CORPORATION

2700 CAMPUS DRIVE

SAN MATEO, CALIFORNIA 94403

Owner Approval:

Date 4-26-82

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0 4-	27-82	JLV		JW/DW	Issued For Construction & CC-12

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#### 1.0 GENERAL

- 1.1 This specification covers the requirements for the construction of the Reservation Canyon Tailing Disposal Dam for the Mercur Gold Project as it is indicated on the drawings and as specified herein.
- 1.2 The State Engineer or a duly authorized representative from the State Engineer's office has full authority to inspect the construction at any time.

### 2.0 APPLICABLE CODES

2.1 Except as noted within this specification all work shall conform to the documents listed below. These documents are declared to be a part of this specification the same as if fully set forth herein:

All Federal, State and County regulations as they apply.

2.2 Wherever they are referred to in this specification the documents listed below are declared to be part of this specification the same as if fully set forth herein:

American Society for Testing Materials

ASTM D-698-70 Mositure-Density Relations of Soil and Soil Aggregate Mixtures Using 5.5 lb. Rammer and 12 inch Drop.

ASTM D-2049-69, Relative Density of Cohesionless Soils

ASTM D-1557-70 Mositure-Density Relations of Soils Using 10 lb Rammer and 18 inch Drop.

ASTM C131-76 Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.

ASTM C535-69 Resistance to Abrasion of Large Size Coarse Aggregate by Use of the Los Angeles Machine.

ASTM C88-76 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

Contract No. 2385A General Specification No. GC-18 2.0 APPLICABLE CODES (cont'd) Department of the Army EM1110-2-1906 "Laboratory Soils Testing" November 30, 1970. Chapter 1 May 1 1980. 3.0 SUBSURFACE CONDITIONS The following geotechnical reports have been prepared 3.1 and are available for inspection at the San Mateo office of Davy McKee. 3.1.1 Report of Preliminary Tailings Dam Study, Dames & Moore, Oct. 12, 1981. 3.1.2 Basic Geotechnical Data Report, Reservation Canyon Dam Site, Mercur Gold Project, Tooele County, Utah, Woodward-Clyde Consultants, Jan. 15, 1982. Preliminary Geological Report Potential Borrow 3.1.3 Sources, Reservation Canyon and Meadow Canyon Dam Site, Mercur Gold Project, Tooele County Utah, Woodward-Clyde Consultants Jan. 4, 1982. 3.1.4 Preliminary Geological Report, Reservation Canyon Dam and Reservoir, Mercur Gold Project, Tooele County, Utah. In-Situ Density Testing Reservation Canyon and 3.1.5 Meadow Canyon Dam Site, Mercur Gold Project, Woodward-Clyde Consultants Jan. 27, 1982. Geotechnical Report, Tailings Dam, Reservation 3.1.6 Canyon, Mercur Gold Project, Davy McKee, February 1982. 4.0 CLEARING AND GRUBBING The area to be occupied by the permanent construction 4.1 required under these specifications and the surfaces of all borrow pits shall be cleared and grubbed of all trees, stumps, roots, brush, and other deleterious materials as determined by the Engineer. Top soil from the foundation, borrow or impoundment areas shall be stored in zones designated by the Engineer. Removed combustible material shall be burned in accordance with all applicable laws and rules, or buried outside the dam area. 4

## 5.0 EXCAVATION

- 5.1 The complete tailings dam foundation shall be on competent rock as determined by the engineer, and as shown on the drawings.
- 5.2 Excavation areas shall be graded and properly maintained to insure adequate drainage at all times. Any depressions or irregularities shall be filled and compacted. Work shall be suspended when it is wet, muddy, or otherwise in such condition that the area cannot be properly manipulated.
- 5.3 Excavated material, not approved for use in the embankments by the Engineer, shall be disposed of in spoil areas designated by the Engineer.
- 5.4 Core and Filter Foundation Contact and Abutment Preparation.
  - 5.4.1 The core and filter foundation and abutment excavations shall be made in such a manner as to expose a suitable foundation surface consisting of competent limestone or Manning Canyon Shale as approved by the Engineer.
  - 5.4.2 During excavations, rainfall runoff and ground water shall be kept drained by ditching, sumping and pumping or other suitable methods.
  - 5.4.3 Dimensions of the core and filter foundation and abutment excavations shall be as indicated on the drawings or as specified herein. The maximum slope at abutments shall be 0.5 horizontal to 1 vertical. In extreme cases, the following slopes may be allowed: 0.25 horizontal to 1 vertical for heights less than 10 feet.
  - 5.4.4 Side slopes shall be reasonably smooth and uniform and shall be cleaned of all loose and protruding material. Overhangs and reversed slopes shall be eliminated. No vertical walls shall be allowed in abutments. Sharp corners of rock strata shall be bevelled off to avoid sharp, protruding angles in the core.
  - 5.4.5 All loose or detached rock, as well as soft erodible seams and pockets of earth shall be removed from the foundation and abutments (this may require use of hand methods, picking, barring, and wedging and/or other suitable means). Loose materials may be found in cracks or joints. All cracks and/or joints shall

## 5.0 EXCAVATION (cont'd)

be cleaned out to 3 times their maximum width or to a depth of 6 inches, whichever is greater. Subsequently, they shall be filled with grout.

- 5.4.6 The grout shall consist of a 1:1 (by volume) water-cement mixture.
- 5.4.7 Prior to the placement of any filter material and/or any impervious core material the foundation shall be blown clean using blow pipes and compressed air".
- 5.4.8 Placement of impervious core material and/or filter material shall take place within 24 hours of air cleaning the foundation or abutment and/or after approximately one hour after placement of the grout coating.
- 5.4.9 Foundation rock shall not be exposed for longer than one day.

#### 6.0 FOUNDATION DEWATERING

- 6.1 In the event water is found, dewatering procedures shall be followed.
- 6.2 Prior to beginning work on dewatering the foundation, the Contractor shall submit for approval a plan showing his proposed method. The plan may be placed in operation upon approval, but nothing in this section shall relieve the Contractor from full responsibility for the adequacy of the system.
- 6.2 The dewatering shall be accomplished in a manner that will result in all construction operations being performed in the dry.

## 7.0 BORROW

- 7.1 The materials required for construction may be obtained from the foundation excavation and from the borrow areas shown on the drawings. Coarse and fine filter material shall be provided by the contractor.
- 7.2 The type of equipment used and the excavation of material in the borrow areas shall be such as will produce the required uniformity of mixture of each of the types of materials specified.

## 7.0 BORROW (cont'd)

- 7.3 The contractor shall perform selective excavation of borrow material, as required by the Engineer.
- 7.4 The location and extent of all borrow pits within the borrow areas shall be as directed by the Engineer. The Engineer reserves the right to change the limits or location of borrow pits within the limits of the borrow area in order to obtain the most suitable material.
- 7.5 As far as practical, the material shall be conditioned in the borrow pit before hauling and placement on the embankment. When moisture is introduced into the soil at the borrow pit, care shall be exercised to mix the material uniformly to produce the required moisture during compaction, avoiding excess accumulation of water in the soil.
- 7.6 The Engineer will designate the depth of cut in all parts of the borrow area, and the cuts shall be made to such designated depths.

### 8.0 FILL MATERIALS AND THEIR BORROW SOURCES

8.1 Six types of materials shall be used in the embankment construction. They are shown in the following table:

Zone	Zone Description	Material Description
I	Downstream Shell Cover	Limestone rock and limestone fragment
II	Downstream Shell	Clayey gravel, sandy gravel, and clayey to silty sand.
III	Coarse Filter - Drain	Gravel sand mixture
IV	Fine Filter	Fine to coarse sand
V	Impervious Core	Clayey silt to silty clay and decomposed shale
VI	Upstream Shell	Clayey gravel, sandy gravel, and boulders.

## 8.0 FILL MATERIALS AND THEIR BORROW SOURCES (cont'd)

#### 8.2 Zone I Material

This material may be obtained from borrow areas adjacent to the dam as shown on the drawings and as designated by the Engineer, and from the foundation excavation. All materials composed of mudstone, claystone, and siltstone shall not be used for construction of these zones. The materials shall be free of vegetation debris, organic matter, and other deleterious materials. The maximum particle size shall be 12 inches.

- 8.3 Zone II material shall consist of clayey gravel, sandy gravel, and clayey to silty sand. The maximum particle size shall be 8 inches. This material may be obtained from the foundation excavation and/or from the overburden overlying Zone V material in the impondment area. This material shall be free of roots, organics, and other deleterious materials.
- 8.4 Zone III material shall meet the following requirements:

Sieve Size (Square Openings)	Percent Passing by Weight
3 inch	100
3/8 inch	90 to 50
No. 8	50 to 10 <sup>-</sup>
No 16	30 to 5
No. 100	8 to 0
No. 200	5 to 0

In addition, the fines (-200 size material) shall be cohesionless, and the Los Angeles Abrasion Loss (500 revs) shall be 40 percent or less.

# 8.5 Zone IV material shall meet the following requirements:

Sieve Size	Percent Passing
(Square Openings)	by Weight
3/8 inch No. 4 No. 16 No. 50 No. 200 (fines)	100 100 to 84 84 to 46 50 to 18 16 to 5

## 8.0 FILL MATERIALS AND THEIR BORROW SOURCES (cont'd)

In addition, the fines (-200 sieve material) shall be cohesionless.

8.6 Zone V material shall consist of relatively soft shale and clay found in the impoundment borrow area. In addition, clay material found in the foundation excavation may also be used for core material. The material for Zone V shall be free of roots, organics and other deleterious materials. The following are the gradation requirements:

Particle Size	Percent Passing by Weight
3 inches 3/4 inch No. 4 No. 30 No. 200	98 to 76 86 to 46 68 to 34 52 to 25

In addition, the Plasticity Index shall be greater than 15.

#### 8.7 Zone VI Material

This material may be obtained from borrow areas adjacent to the dam (as shown on the drawing) as designated by the Engineer, and from the foundation excavation. All materials composed of mudstone and claystone shall not be used for construction of this zone. The materials shall be free of vegetation debris, organic matter, and other deleterious materials. In addition, the finer material shall be placed adjacent to the core. The coarser material (more rock like) available in the borrow-pit and/or the foundation excavation shall be selected for this zone. The maximum particle size shall be 12 inches. A minimum of 70 percent by weight of the material shall be retained in the No. 4 Sieve.

## 8.0 FILL MATERIALS AND THEIR BORROW SOURCES (cont'd)

8.8 The placement of all fill materials are subject to the approval of the Engineer.

#### 9.0 EMBANKMENT

- 9.1 The suitability of each part of the foundation for placing embankment materials thereon, and of all materials for use in embankmant construction, shall be determined by the Engineer.
- 9.2 In any separate portion of dam being constructed, each layer of each zone shall be constructed continuously and approximately horizontal for the width and length of such portion at the elevation of the layer.
- 9.3 The distribution and gradation of the material throughout the earthfill shall be such that the fill will be free from lenses, pockets, streaks, or layers of material differing substantially in texture, gradation, or moisture from the surrounding material. In addition, the more pervious materials shall be placed toward the outer slopes of the embankment.
- 9.4 If, in the opinion of the Engineer, the surface of the layer of earthfill is too dry or smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and/or worked with harrow, scarifier, or other suitable equipment, in an Engineer approved manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer of earthfill material is placed.
- 9.5 The surface of each lift or layer shall be approximately horizontal, but after compaction shall have sufficient slope to provide for runoff of surface water. At no point on the dam or dike embankment shall any ponding of water be allowed at anytime. If, as a result of rainfall or any other cause of excessive moisture, the embankment working surfaces become saturated and are unsuitable, the materials shall be removed from the surface, to such depths as may be required by the Engineer, to expose firm compacted materials before resuming the fill placement and compaction operations.

Contract No. 2385A General Specification No. GC-18 EMBANKMENT (cont'd) 9.0 Because the embankment shall be built in stages, it will be necessary, as directed by the Engineer, to remove and scarify material from the downstream slope and crest of the embankment. This shall ensure adequate bondage between new and old fill. Care shall be taken to remove and recompact old fill damaged by frost penetration. In addition, should vegetation or other deleterious material be found, this shall be removed in a manner approved by the Engineer. The excavation and embankment construction work will be 9.7 carried out under the supervision of the Engineer.

- 9.8 Additional embankment quality control tests may be performed for the Engineer by an appointed subcontractor or directly by the Engineer. These tests shall comply with the Inspection and Quality Control Specification.
- 9.9 No fill shall be placed over any area where tests are in progress until the tests have been reported and the Engineer has advised the Contractor that it may continue.
- 9.10 Equipment contaminated with fine grain soil shall not be allowed to run over the fine and coarse filter zones (zones III and IV).
- 9.11 Zones II, V and VI material shall be gently sloped (1 to 5 percent) so as to direct runoff away from the fine and coarse filters (Zones III and IV), thus preventing fines from contaminating the filters.
- 9.12 The downstream horizontal drainage zone shall be completely placed and covered by two lifts of Zone II material as soon as possible to prevent contamination of the blanket by exposure of surface waters carrying fines.
- 9.13 Except when allowed by the Engineer, placement of coarse filter materials shall be kept higher than adjacent fine filter material, and placement of filter material in general shall be kept higher than adjacent fill to prevent contamination of filters.
- 9.14 Except as approved by the Engineer, compaction equipment shall comply with the requirements stated in "Civil Work Construction Guide Specification", CW-02212, Feb. 1976, Department of the Army, Corps of Engineers, Office of the Chief of Engineers.

#### 10.0 COMPACTION

All the following compaction requirements shall be for in place materials.

10.1 Slope Protection - Zone I

Each layer shall be placed in lifts not exceeding 12 inches in loose thickness and compacted using 4 passes of a 10 ton or heavier vibratory roller.

10.2 Downstream Shell Material - Zone II

Each layer shall be compacted to a minimum of 98 percent of maximum dry density as determined by the "Compaction Test for Earth-Rock Mixtures" Department of Army EM 1110-2-1906. Appendix VI A.

10.3 Coarse Filter Material - Zone III

Each layer shall be placed in lifts not exceeding 12 inches in loose thickness. Compaction shall be with 4 passes of a 10 ton or heavier vibratory roller. No water content control is required and the material shall be compacted in its as-received condition.

10.4 Fine Filter Material - Zone IV

Each layer shall be placed in lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 98 percent of maximum density as determined by ASTM D-698. The moisture content shall be kept within between 0 and 3 percent above optimum.

10.5 Core Material - Zone V

Each layer shall be placed in lifts not exceeding 8 inches in loose thickness compacted to a minimum of 98 percent of the maximum density as per ASTM D-698. Compaction shall be carried out using a sheepsfoot roller. Moisture content shall be kept within 0 to 3% above the optimum moisture content.

## 10.6 Zone VI Material

Each layer shall be compacted to a minimum 98 percent of the optimum dry density as determined by the "Compaction Test for Earth-Rock Mixtures" Department of Army EM 1110-2-1906 Appendix VI A.

10.7 Compaction requirements in this section may be modified at any later time as required for adequate compaction, as determined by the Engineer.

## 11.0 LIFT ELEVATIONS

- 11.1 The difference in elevation between points in the embankment shall be limited to 3 feet when measured in a direction perpendicular to the longitudinal axis of the dam. This applies to points within the same zone as well as points in any two different zones, except that the difference in elevation between points in Zone II and the other zones may be larger than 3 feet.
- 11.2 A portion of Zone II, the downstream shell, may be built ahead of the rest of the embankment. However, the Contractor shall provide the Engineer with specific plans to assure that fines carried in runoff from Zone II material are not allowed to contaminate the filters (Zones III and IV). Any contaminated filter material, as determined by the Engineer, shall be removed and new material shall be placed.
- 11.3 The approval of a construction plan by the Engineer shall not relieve the Contractor from the absolute and total responsibility to preclude contamination of the filters.

## 12.0 WEATHER LIMITATIONS

12.1 In no case shall frozen soils be placed in any portion of the embankment nor shall any fill materials be placed upon frozen embankment surfaces.

## 13.0 PROTECTION OF THE EMBANKMENT

13.1 It shall be the Contractor's responsibility to protect the embankment from freezing. Where required, this may be accomplished with the placement of dry lifts on the embankment at the end of each day of operation or by other methods approved by the engineer.

#### 14.0 SLIDES

14.1 In the event of slides in any part of the embankment prior to final acceptance of the work, the Contractor shall remove material from the slide area, as directed, and shall rebuild such portion of the embankment. In case it is determined that the slide was caused through the fault of the Contractor, the removal and disposal of material and the rebuilding of the embankment shall be performed without cost to the Owner; otherwise this work will be paid for at the applicable contract unit prices for borrow excavation and compacted fill or backfill.

## 15.0 PIEZOMETERS AND MONUMENTS

- 15.1 Piezometers will be supplied by others and shall be installed on the embankment foundations by the Contractor. Fill around these devices shall be placed and compacted to the density prescribed for the class of the material being placed.
- 15.2 The Contractor shall furnish and install surface monuments as shown on the drawings. The Contractor shall furnish to the Engineer the horizontal and vertical location of each reference mark with respect to established bench marks at the time of installation and every seven calendar day thereafter until completion of the contract. The Contractor shall conduct his operations in such a manner that the reference marks will not be disturbed or damaged. Any reference mark disturbed or damaged due to negligence on the Contractor's part shall be replaced or repaired and the correct horizontal and vertical locations shall be furnished at the Contractor's expense.

# 16.0 CLAY/SHALE IMPOUNDMENT LINER

- 16.1 The liner shall consist of a 2-ft. thick compacted clay and/or shale liner. It shall be Zone V material as specified in paragraph 8.6 of this specification.
- 16.2 Except when indicated in paragraph 16.4, the foundation surface shall be scarified, and compacted using 3 passes of a sheep's foot vibratory roller.
- 16.3 The compaction specifications for the liner shall conform to paragraph 10.5 of this specification.
- 16.4 If the foundation consists of Manning Canyon shale, it shall be scarified to a depth of 1 foot and compacted according to paragraphs 8.6 and 10.5 of this specification. No additional liner shall be placed in this case.